

Weekly Updates On ν e Meeting

Flux Parameters Fitting & Error Band & Flux High Energy Tail Fitting

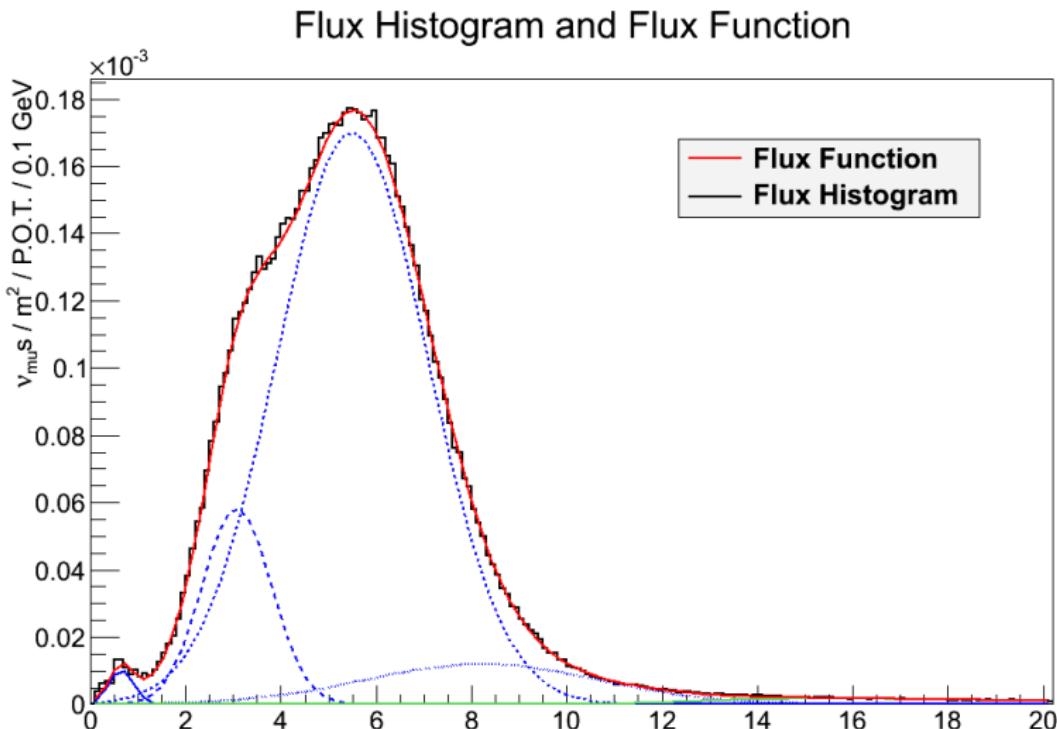
Wenting Tan

Hampton University

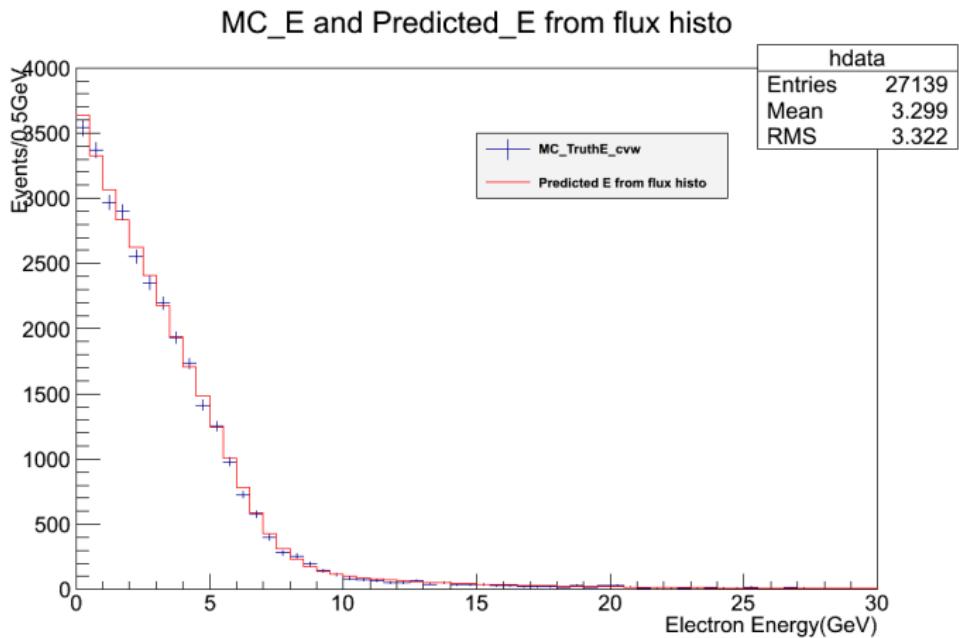
July 24, 2013



Flux Function



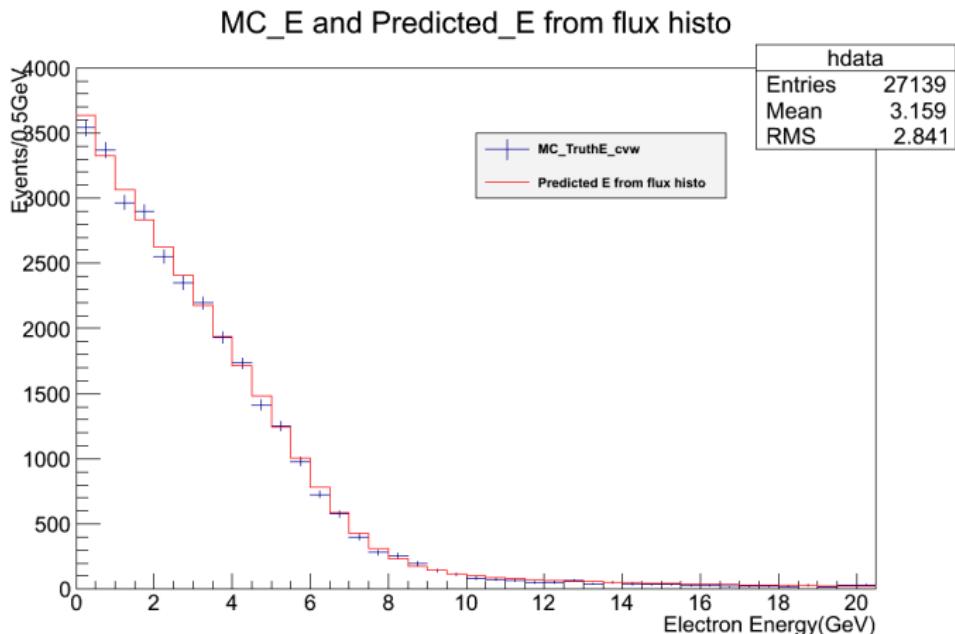
Genie Data and Ke Prediction from Original Flux Histogram



Genie Data and Ke Prediction from Original Flux Histogram
 $\chi^2 = 1.645$ (Calculate range: 0-30 GeV; Bin-size: 0.5 GeV)

Excel checked

Genie Data and Ke Prediction from Flux Function



Genie Data and Ke Prediction from Flux Function Histogram
 $\chi^2 = 2.586$ (Calculate range: 0-30 GeV; Bin-size: 0.5 GeV)

Excel checked

Chi^2 Calculation

$$\chi^2 = \frac{1}{N} \sum_1^N \frac{(K_{e_{measured}} - K_{e_{predicted}})^2}{K_{e_{predicted}}}$$

FluxHist vs Genie: 1.505

FluxFun vs Genie: 1.836

5Pars Fitting(Converged)

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File Edit View Search Terminal Help
    -1.0912e+00  -2.9903e-01   3.6007e-01   1.5317e+00   4.4984e+00
MINUIT WARNING IN HESSE
=====
MATRIX FORCED POS-DEF BY ADDING 1.095681 TO DIAGONAL.
FCN=1.72732 FROM MIGRAD      STATUS=CONVERGED      288 CALLS      289 TOTAL
                           EDM=0.000149964   STRATEGY= 1   ERR MATRIX NOT POS-DEF
EXT PARAMETER APPROXIMATE      STEP      FIRST
NO.   NAME      VALUE      ERROR      SIZE      DERIVATIVE
  1   a1        1.72131e-04  4.53460e-05  6.36562e-09  1.45777e+03
  2   m1        5.47269e+00   3.19585e-01   1.22575e-04  7.54320e-02
  3   s1        1.54411e+00   9.07118e-02   2.30798e-05  -4.93603e-01
  4   a2        4.70387e-05   3.81672e-04   2.06755e-08  6.26233e+01
  5   s2        9.50324e-01   3.32224e+00   4.45354e-04  -4.23100e-03
EXTERNAL ERROR MATRIX.  NDIM= 25   NPAR= 5   ERR DEF=1
  2.056e-09  1.298e-05  3.910e-06  -1.716e-08  1.466e-04
  1.298e-05  1.021e-01  2.632e-02  -1.126e-04  9.931e-01
  3.910e-06  2.632e-02  8.229e-03  -3.362e-05  2.885e-01
 -1.716e-08  -1.126e-04  -3.362e-05  1.457e-07  -1.254e-03
  1.466e-04  9.931e-01  2.885e-01  -1.254e-03  1.104e+01
ERR MATRIX NOT POS-DEF
PARAMETER CORRELATION COEFFICIENTS
NO. GLOBAL      1      2      3      4      5
  1  0.99453   1.000   0.895   0.951  -0.991   0.973
  2  0.94131   0.895   1.000   0.998  -0.923   0.935
  3  0.97724   0.951   0.908   1.000  -0.971   0.957
  4  0.99826   -0.991  -0.923  -0.971   1.000  -0.989
  5  0.99186   0.973   0.935   0.957  -0.989   1.000
ERR MATRIX NOT POS-DEF
par: 0.000172131, par error: 4.5346e-05
par: 5.47269, par error: 0.319585
par: 1.54411, par error: 0.0907118
par: 4.70387e-05, par error: 0.000381672
par: 0.950324, par error: 3.32224
  2.05626e-09  1.29752e-05  3.91025e-06  -1.71587e-08  0.000146575
  1.29752e-05  0.102134  0.0263196  -0.00011262  0.993145
  3.91025e-06  0.0263196  0.00822862  -3.36191e-05  0.288499
 -1.71587e-08  -0.00011262  -3.36191e-05  1.45673e-07  -0.00125386
  0.000146575  0.993145  0.288499  -0.00125386  11.0373
root [2] ■
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High Energy Tail Normalization

Use the tail(20-50 GeV) of the electron energy data to constrain the flux high energy tail(20-50 GeV).

In the prediction(flux histogram):

take the ratio flux->Integral(20,50)/Ke data -> Integral(20,50)

$$R = \frac{\text{FluxHistToIntegral}(20 - 50 \text{ GeV})}{\text{KePredictionIntegral}(20 - 50 \text{ GeV})} = \frac{8.0147e - 6}{326}$$

In the ke fitting code, 20-50 tail integral of the ke data should be equal to the fitted ke:

$$R = \frac{\text{FluxFunctionIntegral}(20 - 50 \text{ GeV})}{\text{KeDataIntegral}(20 - 50 \text{ GeV})} = \frac{\text{FluxFunctionIntegral}(20 - 50 \text{ GeV})}{322}$$

Fitting the Scaling Par of the tail

Fitted numbers are from last week, not the truth.

p6 is the parameter got fitted.

Par	p0(a1)	p1(m1)	p2(s1)	p3(a2)
True	1.70e-04	5.49215	1.58290	5.83993e-5
Fitted	1.718e-4	5.418	1.573	4.040e-5
Error	0.046e-4	0.148	0.046	0.921e-5
Par	p4(m2)	p5(s2)	p6(a3)	p7(m3)
True	3.07003e+00	7.28800e-1	1.20056e-05	8.21823e+00
Fitted	fixed	9.913e-1	1.203e-05	fixed
Error	–	3.486e-1	?	–
Par	p8(s3)	p9(L1)	p10(L2)	p11(L3)
True	2.47368e+00	$\frac{9.70000e-06}{p6} \times p6$	1.60000e+01	2.20160e+00
Fitted	fixed	combined with p6	fixed	fixed
Error	–	–	–	–
Par	a0	m0	s0	
Value	1.01614e-5	6.46886e-1	2.65780e-1	